Evolutionary Systematics. 10 2026, 47–54 | DOI 10.3897/evolsyst.10.185722

PENSOFT

EVOLUTIONARY SYSTEMATICS

Ubristes mirabilissimus sp. nov., a new stingless bee mimicking hoverfly from the Ecuadorian Amazon (Diptera, Syrphidae, Microdontinae)

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https://zoobank.org/E4100BEE-D788-4731-9C19-E388C1CFC161

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Academic editor: Dagmara Żyła ♦ **Received** 19 January 2026 ♦ **Accepted** 3 March 2026 ♦ **Published** 10 March 2026

Abstract

A new species of *Ubristes* Walker, 1852, *U. mirabilissimus* **sp. nov.**, is described from the Napo Province in the Amazonian part of Ecuador. A key is given to distinguish this species from the other four known species in this genus. Moreover, DNA barcodes were obtained, which constitute the first molecular data for the genus *Ubristes*.

Key Words

Ant flies, DNA barcoding, Ecuador, flower flies, identification key, new species

Introduction

Species of the genus *Ubristes* Walker, 1852 are medium-sized to large (8–14.5 mm) hoverflies with a strong resemblance to Neotropical stingless bees of the genus *Trigona* Jurine, 1807 (Hymenoptera: Apidae: Meliponini). This resemblance is due to the combination of long antennae, thickened hind legs with corbicula-like brushes on the tibiae, and similarities in shape of the abdomen and colouration. Within the Syrphidae, *Ubristes* belongs to the subfamily Microdontinae, the larvae of which are known to be associated with ants. The immature stages of the species *Ubristes*, however, are yet unknown (Reemer 2013a, 2013b; Reemer and Ståhls 2013a, 2013b).

The current number of species included in *Ubristes* is four, namely *Ubristes flavitibia* Walker, 1852, *Ubristes ictericus* Reemer, 2013, *Ubristes jaguarinus* Reemer, 2013, and *Ubristes rex* Reemer, 2017. Reemer (2013a, 2017) discussed the taxonomic history of the genus and the systematics of a polyphyletic group of genera resembling *Ubristes*, all mimics of stingless bees. In the present work we describe a new species of *Ubristes* from Ecuador, with high-quality images and DNA barcodes, and provide an identification key to all known *Ubristes* species.

Material and methods

Morphology and photography

Morphological terminology follows Van Steenis et al. (2023), supplemented with some terms specifically intended for the morphology of male genitalia in Microdontinae as introduced by Reemer and Ståhls (2013b), e.g., the lateral fenestrae of the epandrium.

The studied specimens are deposited in the following institutes:

INABIO Instituto Nacional de Biodiversidad, Quito (Ecuador).
NHMUK Natural History Museum, London (United Kingdom).
ZFMK Museum Koenig Bonn, Leibniz-Institut zur Analyse des Biodiversitätswandels, Bonn (Germany).

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Male genitalia were dissected after the specimen had been softened in a wet chamber for 24 hours. Then, the terminalia were left macerating in lactic acid at room teperature for 24 hours, followed by rinsing in distilled water before being stored in a microvial with glycerine.

Measurements of the studied specimen were taken using an ocular micrometer in a Wild M3B stereo microscope. Body length was measured from anterior part of head (excluding antenna) to apex of abdomen.

For the holotype, label data are given in quotation marks ("...") and line breaks on the label are indicated with a double slash (//).

Photos of the specimen were made through a Zeiss Stereo Discovery v12 microscope, and processed (focus stacking) by Axiovision software. The map was made in Adobe Illustrator, based on locality information in Reemer (2013a, 2017) and the present study (the symbols for the localities were placed by approximation, as locality info is often imprecise).

DNA barcoding

One leg of each sequenced specimen was used for DNA extraction. DNA primers, extraction, amplification, purification, sequencing protocols and edition follow Żóralski et al. (2024) and Müller et al. (2024). The remnants of the studied specimens were preserved and properly labelled as DNA voucher specimens.

All new sequences were submitted to GenBank via BOLD (www.boldsystems.org). GenBank accession numbers (GB) are listed for each sequenced specimen in the text.

Results

Ubristes Walker, 1852

Ubristes Walker, 1852: 217. Type species: *Ubristes flavitibia* Walker, 1852: 217, by original designation.

Differential diagnosis. Species of *Ubristes* have the scutellum without calcars and long, brush-like pilose metatibia and metabasitarsomere, with pile longer than the width of the tibia (Fig. 9). Among the genera with this diagnostic pilosity of the metaleg, *Ubristes* is the only one in which tergite 2 bears a lateral tubercle on both sides at approximately half its length (Fig. 1). The male genitalia are unique among all Microdontinae because of the presence of well-delimited, oval pits on both sides of the epandrium (Figs 11–13), named fenestrae (Reemer and Ståhls 2013b).

In the hitherto described species of *Ubristes*, the wing vein R_{4+5} has a posterior appendix (spur or additional vein) into cell r_{4+5}, a character also found in many other microdontine genera. In *Ubristes mirabilissimus* sp. nov., however, this appendix is absent (Fig. 3). Consequently, our new species would probably run to *Hypselosyrphus* Hull, 1937 in the keys to the genera in Reemer and Ståhls (2013a) and Reemer (2014). All *Ubristes* species differ from *Hypselosyrphus*, as well as from all other microdontine genera, by the presence of lateral tubercles on tergite 2.

Distribution and ecology. Known localities of all species of *Ubristes* are indicated on the map of South America in Fig. 14, based on the label information as published by Reemer (2013a, 2017) and this study. The number of localities per species is very low (two at maximum), so the distribution patterns are undoubtedly very incomplete.

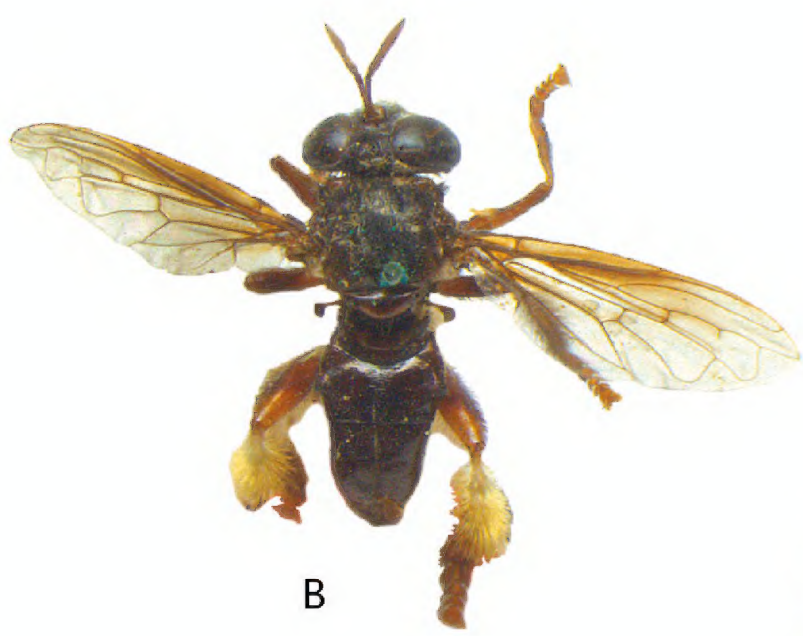
Reemer (2017) discussed the little amount of available information about the ecology of the other *Ubristes* species, and it seems that *Ubristes* species occur in tropical rainforests. *Ubristes mirabilissimus* sp. nov. is not an exception, as both known localities are located in Ecuadorian parts of the Amazon rainforest.

Ubristes mirabilissimus sp. nov.

Figs 1A, 2B, 3B, 5–11

Diagnosis. Body length: 12–14 mm (n = 3). Two species of *Ubristes* with a black abdomen are known: *Ubristes flavitibia* and *U. mirabilissimus* sp. nov. These species differ most notably in the length of the abdomen: about as long as or slightly longer than length of head and thorax together in *U. flavitibia*, approximately 1.5 times as long in *U. mirabilissimus* sp. nov. In addition, *U. mirabilissimus* sp. nov. is the only known species of the genus without posterior appendix on vein R_{4+5}. The male genitalia are similar to those of *U. flavitibia* and *U. jaguarinus* (the only other species of which the males are known), but differ from *U. flavitibia* in the more triangular cercus in lateral view (more rounded in *U. flavitibia*), and from *U. jaguarinus* in the shape of the surstylus, which is not constricted at the base (constricted in *U. jaguarinus*).

Description. Male. Body size: 12.5 mm. ***Head.*** Face occupying 1/2 of head width in frontal view; blackish except for pair of large, triangular, dark yellowish maculae running from antennal fossa to eye margins, gradually widening; white pilose, except black pilose along oral margin. Gena black, black pilose. Oral cavity with lateral margins produced below ventral eye margin. Frons and vertex black; black pilose, except for small patches of golden yellow pile at anterior part of frons and behind ocelli. Occiput black; black pilose dorsally, black and white pilose ventrally. Eye very sparsely and short pilose, with pili about as long as an ommatidium's diameter, appearing bare under low magnification. Antennal fossa about as wide as high. Antenna brown, scape somewhat paler than postpedicel; antennal ratio approx. 4:1:4; postpedicel parallel-sided with narrowly rounded apex, with sensory pit located at 2/3 from base. Arista slender, about 3/4 of length of postpedicel. ***Thorax.*** Postpronotum black; black pilose. Scutum black; black pilose, except for anterolateral patches of golden yellow



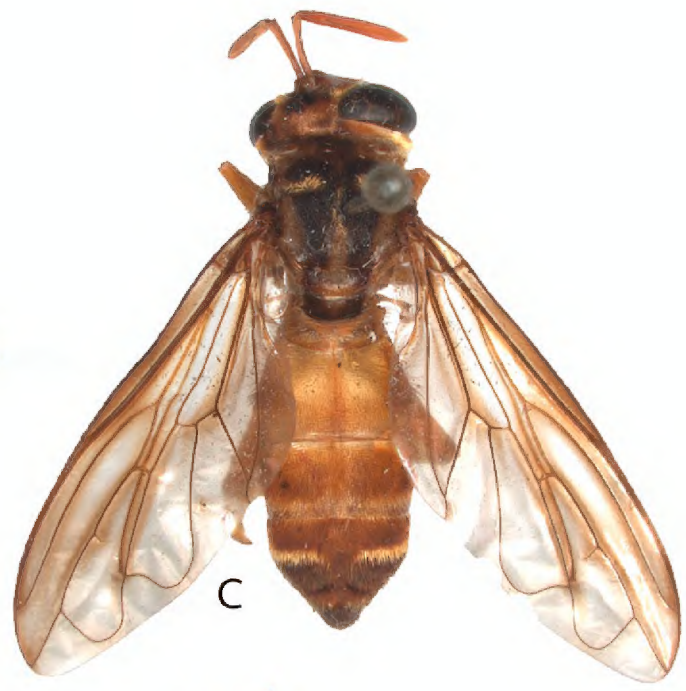
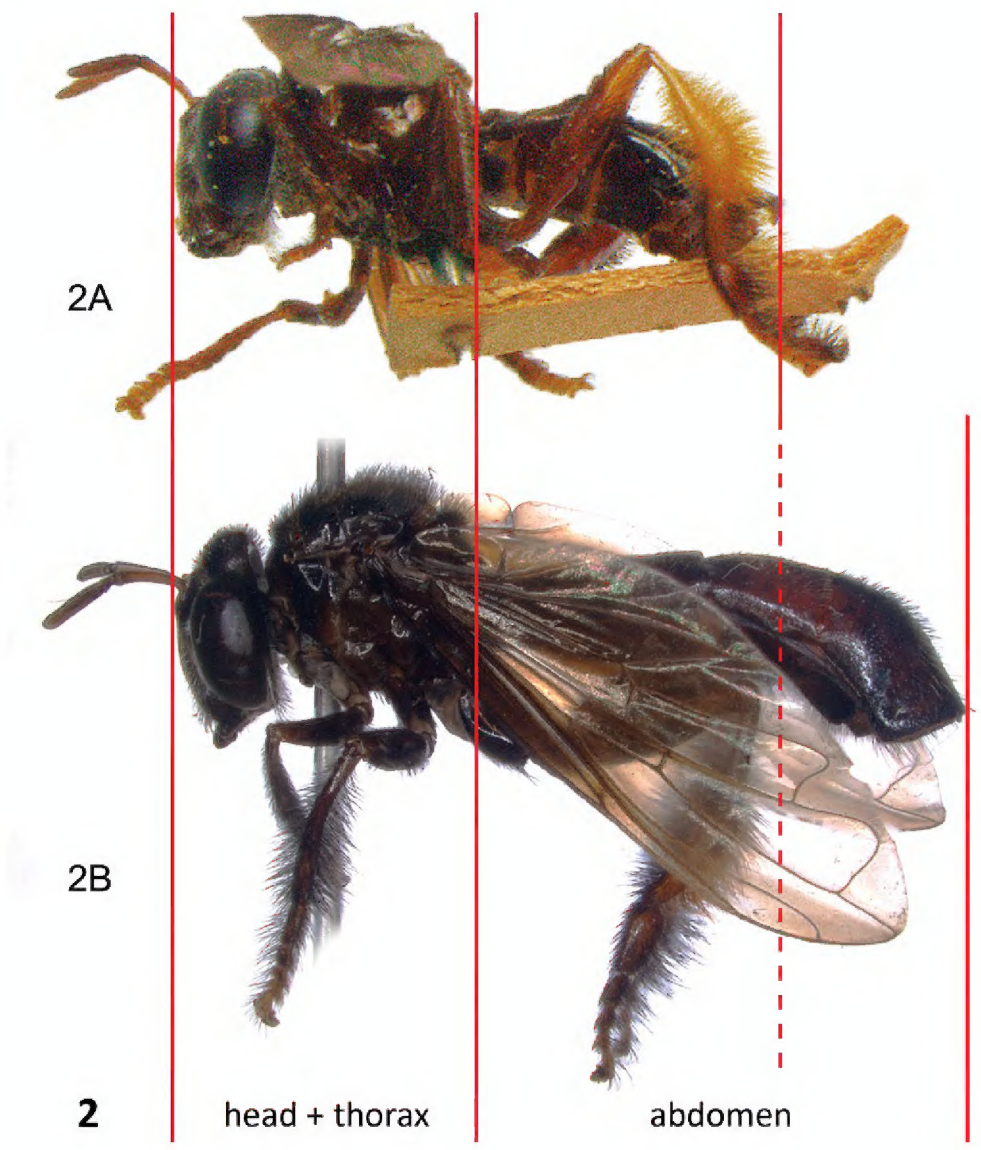
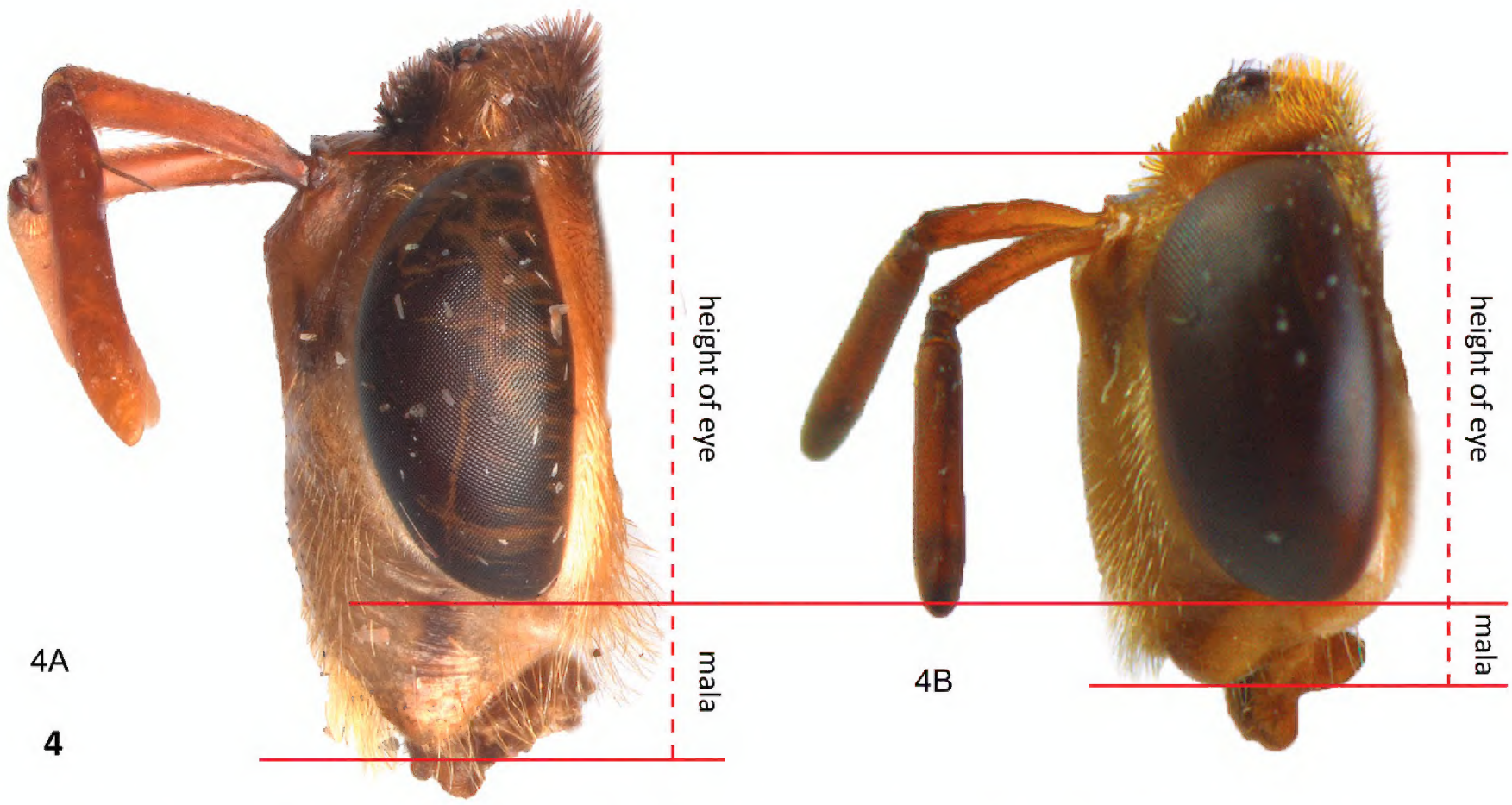


Figure 1. A–E. Dorsal habitus of *Ubristes* species. Note that *U. mirabilissimus* sp. nov. is depicted at a larger scale than the other species, which are depicted at the same scale. **A.** *U. mirabilissimus* sp. nov.; **B.** *U. flavitibia*; **C.** *U. rex*; **D.** *U. ictericus*; **E.** *U. jaguarinus*.



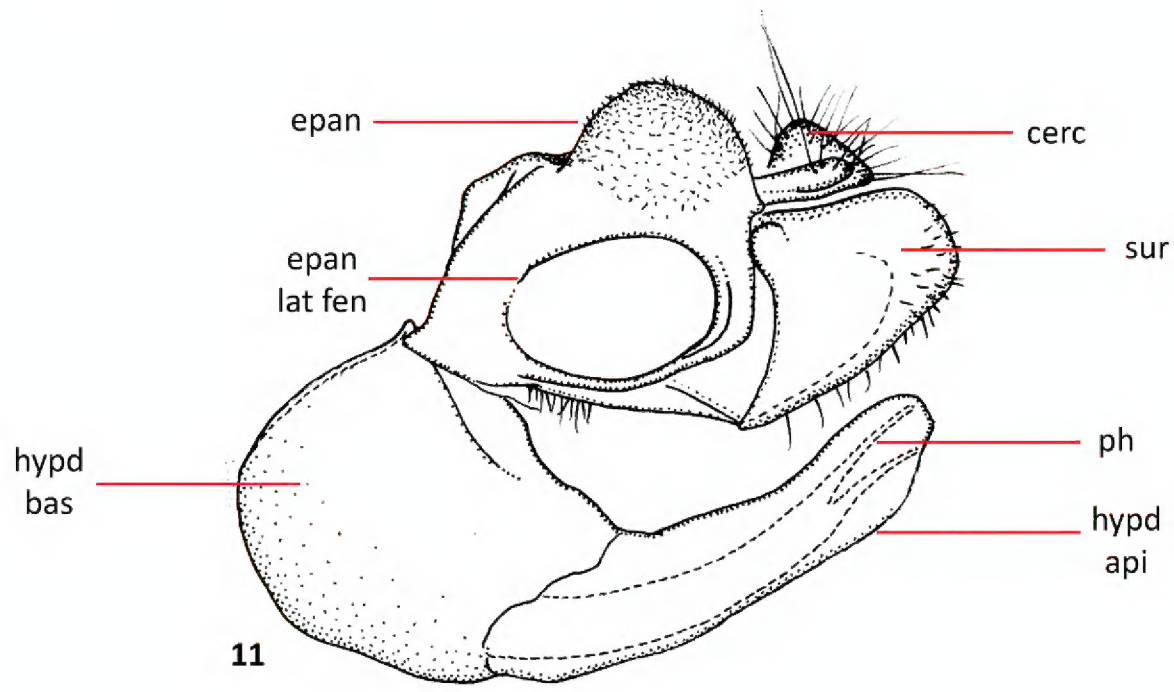


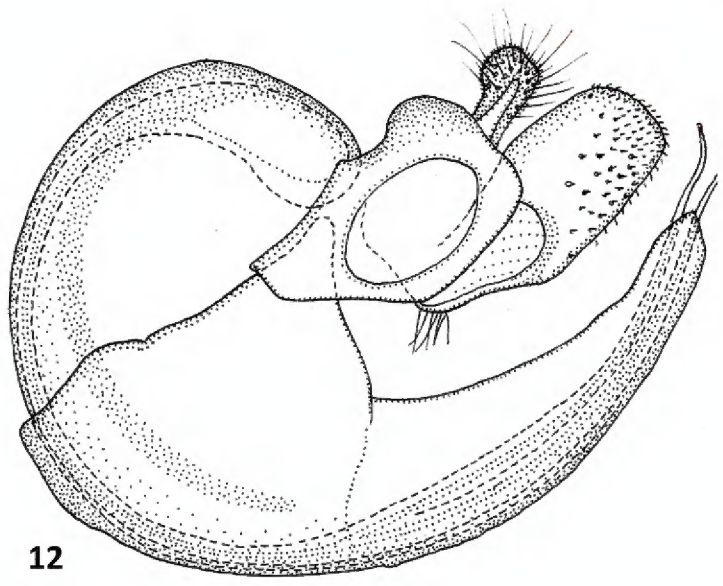
Figures 2–4. 2. Lateral habitus of *Ubristes flavitibia* (**2A**) and *U. mirabilissimus* sp. nov. (**2B**). Red lines indicate length ratios of head + thorax and abdomen. Note that figures are not depicted at the same scale. **3.** Wings of *U. flavitibia* (**3A**) and *U. mirabilissimus* sp. nov. (**3B**) Red circle indicates position of posterior appendix at vein R_{4+5} (present in *U. flavitibia*, absent in *U. mirabilissimus*). **4.** Head in lateral view of *Ubristes rex* (**4A**) and *U. ictericus* (**4B**). Red lines indicate height ratios of eye and mala. Note that figures are not depicted at the same scale.

pile, and V-shaped figure of golden yellow pile posteromedially (only visible in hind view due to orientation of pile). Postalar callus black; black pilose anteriorly, golden yellow pilose posteriorly. Scutellum without calcars; golden yellow pilose, except for a few scattered black pile. Pleuron brownish, except anterior part of anepisternum and katatergum blackish. Anterior and posterior part of anepisternum divided by a weak sulcus; anterior part black pilose, posterior part black pilose along posterior margin. Anepimeron yellow pilose on dorsal half. Katatergum and anatergum long and short black microtrichose, respectively. Katepisternum dorsally long black

Figures 5–10. Holotype of *Ubristes mirabilissimus* sp. nov. **5.** head frontal; **6.** head lateral; **7.** head dorsal; **8.** thorax lateral; **9.** hind leg; **10.** thorax posterodorsal.

pilose, ventrally with a few long black pile. Katepimeron bare. Metasternum posteriorly white pilose. Mediotergum shiny black. Calypter grey. Halter with pale brown stem and black knob. ***Wing***. Dark brown in cell c and basal half of cells sc and r_1, pale brown in other parts. Microtrichose, except bare on following parts: basally in cell r_1 along vein Rs, along anterior and posterior margins of cell br, along anterior margin of cell bm, and entirely bare on alula. ***Legs***. Femora and tibiae dark brown, but apices of femora and apical 1/3 of tibiae yellowish brown, most notably on metatibia. Femora black pilose. Protibia black pilose, with longest pile somewhat longer





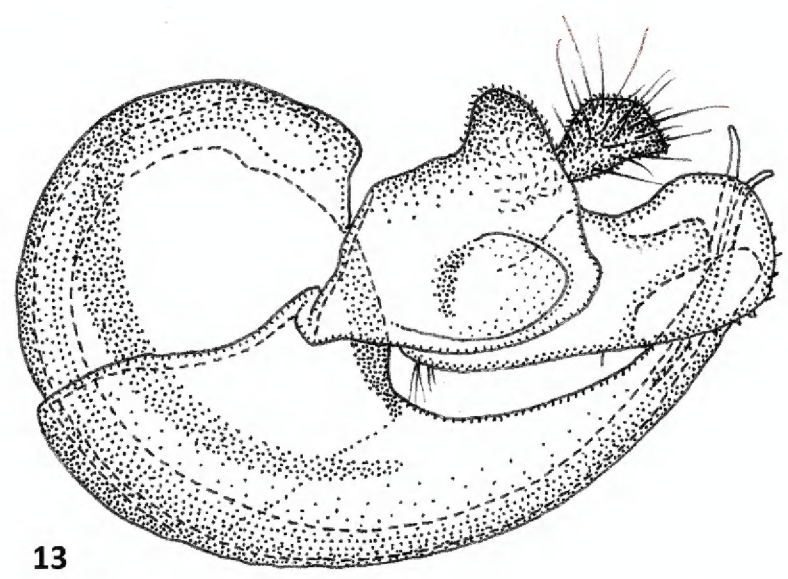


Figure 11–13. Genitalia of *Ubristes* species. **11.** *U. mirabilissimus* sp. nov.; **12.** *U. flavitibia*; **13.** *U. jaguarinus*. cerc = cercus; epan = epandrium; epan lat fen = lateral fenestra of epandrium; hypd api = apical part of hypandrium; hypd bas = basal part of hypandrium; ph = phallus; sur = surstylus.

Figure 14. Distribution of *Ubristes* species.

than width of tibia. Mesotibia with long erect black pile, with longest pile more than twice as long as width of tibia. Metatibia black pilose, except white pilose dorsally on basal half, and golden yellow pilose dorsally on apical half, with longest pile almost twice as long as maximum width of tibia. Tarsi yellowish brown, paler towards apex; black pilose. Coxae and trochanters brown to blackish; black pilose. ***Abdomen.*** Entirely blackish brown. Tergite 1 black pilose laterally, pale pilose submedially. Tergite 2 with pair of large lateral tubercles, with long mixed black and golden yellow pile; other parts of tergite short golden yellow pilose. Tergite 3 short golden yellow pilose, except short black pilose along lateral margins. Tergite 4 short black pilose, except short pale pilose on large posteromedian part. Tergite 1 bare, other tergites long black pilose. Genitalia as in Fig. 11.

Type material. ***Holotype*** #m#. Ecuador • Label 1: "ECUADOR: Napo Prov., Grand // Selva lodge environs, Campo // Cocha Community, loop trail, // 1.107615° S 77.550967° W, // 590 m., 12.Sep.2023, hand-net // Leg.: X. Mengual"; label 2: "ZFMK-DIP 00103449" [with QR-Code]; label 3: "*Ubristes* spec. nov. // det. M. Reemer 2024 // Specimen code MR1648"; label 4 [red]: "HOLOTYPE // *Ubristes* // *mirabilissimus* Reemer & Mengual"; coll. INABIO. GB: PX894625.

Paratypes. Ecuador • same data as holotype (1#m#, ZFMK; ZFMK-DIP-00103450, GB: PX894626);

Figures 15, 16. Habitat of *Ubristes mirabilissimus* sp. nov. at the type locality. Note that this species was not collected in the Malaise trap visible in Fig. 16, but that specimens were flying in its vicinity, close to the ground.

Napo Prov., Grand Selva Lodge, forest trail, 1.098032°S, 77.544467°W, 500 m., 4.Sep.2024, Leg.: X. Mengual (1#m#, ZFMK; ZFMK-DIP-00109772, GB: PX894627).

Additionally studied specimens. Ecuador • 1 #m#; Napo, Muyuna, near Tena; 11.IV.1976; alt. 500 m; leg. M. Cooper; coll. NHMUK.

Etymology. The specific epithet is a superlative form of the Latin word *mirabilis*, an adjective which means 'wonderful' or 'strange'. This name was chosen because the authors believe that this is the most wonderful species of *Ubristes* known so far. Specific epithet to be treated as adjective.

Habitat and flying behaviour. Type material was collected along a trail in lowland, Amazonian rainforest (Figs 15, 16). Individuals were flying very low, close to the ground, with an erratic, zig-zag-like flight. Their flight was not the typical flight of most hoverflies.

Distribution. This species is known from two localities in Napo, a northern province in the Amazon part of Ecuador. The distance between these localities is approximately 35 kilometers.

DNA barcoding. Holotype and paratype males were successfully sequenced, and the three DNA barcodes are identical. These are the first molecular data for the genus *Ubristes*. A quick comparison with other sequences using BLAST (https://blast.ncbi.nlm.nih.gov/Blast.cgi) showed that the *U. mirabilissimus* sequences had less than 85% similarity to other microdontine genera.

Key to the species of *Ubristes*

For figures of the other species besides *U. mirabilissimus* sp. nov. see Reemer (2013a) and Reemer (2017).

1 Abdomen partly or entirely yellow (Fig. 1C, D, E) 3
– Abdomen black (Fig. 1A, B) 2
2 Abdomen in lateral view only slightly longer than head + thorax (Fig. 2A). Tergite II in dorsal view clearly wider than long (Fig. 1B). Vein R_{4+5} with a posterior appendix into cell r_{4+5} (Fig. 3). Body size 8–11 mm (n = 4) ..... *U. flavitibia* Walker
– Abdomen in lateral view 1.5 × as long as head + thorax (Fig. 2B). Tergite II in dorsal view clearly longer than wide (ignore lateral tubercles in measuring) (Fig. 1A). Vein R_{4+5} without a posterior appendix into cell r_{4+5} (Fig. 3B). Body size 12–14 mm (n = 3) ..... *U. mirabilissimus* sp. nov.
3 Abdomen with fasciae of golden pile along posterior margin of tergite 3 and medially across tergite 4 (Fig. 1C). Face strongly produced ventrally: height of mala (*sensu* Van Steenis et al. 2023: distance between ventral eye margin and oral margin) approximately 1/3 of height of eye (Fig. 4A). Metaleg entirely yellow pilose ..... *U. rex* Reemer
– Abdomen without fasciae of golden pile. Face ventrally slightly produced: height of mala (sensu Van Steenis et al. 2023: distance between ventral eye margin and oral margin) maximally 1/5 of height of eye (Fig. 4B). Hind leg with mixed yellow and black pile 4
4 Abdomen more or less unicolourous, yellow (Fig. 1D). Vertex yellow pilose, except for some black pile at ocellar triangle ..... *U. ictericus* Reemer
– Abdomen brownish with yellow maculae (Fig. 1E). Vertex entirely yellow pilose ..... *U. jaguarinus* Reemer

Discussion

Ubristes mirabilissimus sp. nov. is described from Ecuador based on four males, and it is the second *Ubristes* species recorded from this country after *U. ictericus* (Reemer 2013a). Apparently, *Ubristes* species are either rare or easily overlooked. This is no exception among tropical Microdontinae. The majority of microdontines are known from only very few specimens, often only one or two (Reemer 2013a). Besides the four specimens of *U. mirabilissimus* sp. nov. here reported, only 10 *Ubristes* specimens are known (Reemer 2017): *U. flavitibia* (5), *U. ictericus* (3), *U. jaguarinus* (1), and *U. rex* (1). This might partly be explained by the fact that Microdontinae are rarely observed visiting flowers, unlike most other Syrphidae, for which visiting flowers is a characteristic habit. Another possible explanation would be an association with rare species of ants, or ants that build their nests in canopies.

The female of *U. mirabilissimus* sp. nov. is unknown, and so is the male of *U. rex* Reemer, 2017. The possibility that these taxa belong to the same species is rejected here based on the differences in wing venation (absence vs. presence of spur on vein R_{4+5}), and body colouration. There are only minor differences in colour and morphology between the sexes for those *Ubristes* taxa where both sexes are known, i.e., *U. flavitibia* and *U. ictericus*. Consequently, we expect a comparably low degree of sexual dimorphism in *U. rex* and *U. mirabilissimus* sp. nov. We, thus, conclude that our new species is not *U. rex* based on the observed morphological differences.

Acknowledgements

The present results from Ecuador are part of the 'Contrato Marco' for access to the genetic resources of the scientific research project called "Estudio de la sistemática filogenética, taxonomía integrativa y genética de poblaciones de artrópodos terrestres del Ecuador continental" (MAATE-DBI-CM-2024-0406), issued by the Ministerio de Ambiente, Agua y Transición Ecológica de Ecuador. We thank Diego J. Inclán and Ana B. García-Ruilova (INABIO) for their help with logistics. We thank Jana Thormann (ZFMK) for her help to obtain the molecular data.

We thank Duncan Sivell, Nigel Wyatt and Erica McAlister of the NHMUK for their help to study specimens from the collection under their care.

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